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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LUGO, DAVID B

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 05/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/230,069

Applicant(s)

SEGAL ET AL.

Examiner

David B. Lugo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other:

DETAILED ACTION

Oath/Declaration

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

The signature of the second named inventor is not in permanent ink, or its equivalent in quality, as required under 37 CFR 1.52(a).

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 404 (page 5, line 26). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The specification is objected to because of the following informalities:
Page 6 line 3, both occurrences of “s₃[n]” should be --s₄[n]-- to correspond with the output signal from FFE FIR filter 502 shown in Fig. 5.
Appropriate correction is required.

Claim Objections

4. Claims 1-15, 20, and 21 are objected to because of the following informalities:
Claim 1, line 11, “operable receiving” should be -- operable *for* receiving--.
Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 1, 7-15, 20, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Chennakeshu et al. U.S. Patent 5,283,811.

Regarding claims 1 and 20, Chennakeshu discloses in Fig. 2, a communications system comprising a transmitter and a receiver with an input for receiving a modulated signal, a front end unit performing analog to digital conversion, demodulating the modulated analog signal to extract the digital information, performing timing control, and producing a demodulated complex-valued digital signal (see column 5 lines, 42-54). Chennakeshu further discloses in Fig. 3 a first filter for receiving the demodulated complex valued digital signal and a second filter (comprising DFE equalizer 40) that reduces the intersymbol interference. The first filter is considered to comprise the wire for transferring the demodulated complex valued digital signal

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to the second filter since it performs the function of the first filter as defined in the claim. The receiver is also considered to comprise a symbol-to bit converter for converting the detected symbols to the digital speech information processed by vocoder 16.

Regarding claims 7-13, Chennakeshu further discloses the Complex Fast-Kalman Algorithm used to update tap coefficients in col. 8 line 10 - col. 9 line 34.

Regarding claim 14, Chennakeshu further discloses in Fig. 5 that the second filter further comprises an adaptive rotator 45 connected to the DFE equalizer 40, which comprises an adaptive feed forward equalizer (FFE equalizer 50 along with associated multipliers 54), a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter (feedback filter 52 along with associated multipliers 54), the output of which is connected to update adaptive rotator, the feed forward equalizer, and the adaptive filter, as shown in Figs. 4 and 5. Chennakeshu further discloses a symbol detector 42 and that the adaptive filter is connected to the symbol detector.

Regarding claim 15, the signal is modulated according to a phase shift-keying format (see col. 5 lines 21-22).

Regarding claim 21, the receiver is used in a telephone network.

7. Claims 1, 3, 4, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Strolle et al. U.S. Patent 5,550,596.

Regarding claims 1 and 20, Strolle discloses in Fig. 1 a front end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature I, Q components, performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further

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discloses a digital equalizer comprising a first filter and a second filter comprising DFE 22 for reducing ISI, and a converter recovering the digital information.

Further regarding claim 20, it is inherent that the receiver is part of a communications system further comprising a transmitter and a communications medium.

Regarding claims 3 and 4, Strolle further discloses a rotator 16, and states that the system may use blind equalization (i.e. without training data) in column 3 line 6.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh U.S. Patent 5,572,262 and Chennakeshu.

Strolle discloses in Fig. 1 a front-end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature components, and performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further discloses a pre-equalizer comprising a co-channel notch filter 18, a decision feedback equalizer comprising DFE 22, and a converter recovering the digital information.

Strolle does not expressly disclose that the pre-equalizer comprises an adaptive filter, a first summation circuit for producing a pre-equalized signal, a function circuit connected to the

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summer for producing a non-linear response to the pre-equalized signal, and an adaptation circuit for adjusting the filter taps.

Ghosh discloses a co-channel rejection filter in Fig. 5A comprising an adaptive filter 43, a summation circuit 41, where the taps of the adaptive filter are adjusted according to the output of the summation circuit.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use the adaptive co-channel rejection filter taught by Ghosh in the receiver of Strolle in order to prevent situations that cause conditions undesirable for adjacent channel rejection, as stated by Ghosh in col. 3 lines 33-36, and to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

Strolle further does not disclose that the decision feedback equalizer comprises a rotator, a feed forward equalizer, a second summation circuit, a symbol detector, and a second adaptive filter.

Chennakeshu discloses an equalizer comprising decision feedback equalizer comprising an adaptive rotator 45 connected an adaptive feed forward equalizer, a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter that is connected to a symbol detector 42 which detects the symbols output from the summation circuit.

It would have been obvious to one of ordinary skill in the art to use the equalizer taught by Chennakeshu in the receiver of Strolle and Ghosh to reduce sensitivity to sample timing jitter.

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10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh.

Regarding claim 17, Strolle discloses in Fig. 1 a front-end unit comprising an input processor 12 that performs A/D conversion, splits the signal into quadrature components, and performs a demodulation process and timing recovery (see col. 2 lines 42-53). Strolle further discloses a pre-equalizer comprising a co-channel notch filter 18, an equalizer comprising DFE 22 for reducing ISI, and a converter recovering the digital information.

Strolle does not expressly disclose that the pre-equalizer comprising the co-channel notch filter is adaptive.

Ghosh discloses an adaptive co-channel rejection filter in Fig. 5A.

It would have been obvious to one of ordinary skill in the art to use the adaptive co-channel rejection filter taught by Ghosh in the receiver of Strolle in order to prevent situations that cause conditions undesirable for adjacent channel rejection, as stated by Ghosh in col. 3 lines 33-36.

Further, Strolle does not expressly disclose that the quadrature components are derived by multiplying the digital signal with sine and cosine signals. However, one of ordinary skill in the art would recognize that the splitting of the signal into quadrature components may be performed by multiplying the digital signal with sine and cosine signals to extract the quadrature information.

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11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh as applied to claim 17 above, and further in view of White et al. U.S. Patent 4,843,583.

Regarding claim 18, Ghosh further discloses that the adaptive pre-equalizing step further comprises adaptively filtering the input signal, summing the input with the output from the filter, and modifying the taps of the filter in response to the input and the output from the summer.

Strolle and Ghosh do not expressly disclose that a non-linear response is generated for the adjustment of the filter taps.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer disclosed by Strolle-Ghosh to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of Ghosh as applied to claim 17 above, and further in view of Chennakeshu et al.

Strolle and Ghosh disclose all of the limitations of claim 19 except that the adaptive equalizing step comprises adaptively rotating the pre-equalized signal, adaptively filtering the rotated signal to produce a filtered rotated signal, summing the filtered rotated signal with an adaptive filter output to produce an adapted complex-valued signal, detecting the symbols in the adapted complex-valued signal to produce a corrected complex-valued symbol signal, and producing the adapted filter output by adaptively filtering the corrected complex valued symbol signal.

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Chennakeshu discloses an equalizer comprising an adaptive rotator 45 connected to a DFE 40, which comprises an adaptive feed forward equalizer, a summation circuit 58 connected to the feed forward equalizer and to an adaptive filter that is connected to a symbol detector 42 which detects the symbols output from the summation circuit.

It would have been obvious to one of ordinary skill in the art to use the equalizer taught by Chennakeshu in the receiver of Strolle and Ghosh to reduce sensitivity to sample timing jitter.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chennakeshu et al. in view of White U.S. Patent 4,005,426.

Chennakeshu discloses all of the limitations of claim 2, except that the first filter operates to reduce the eigenvalue spread of the input signal.

White discloses an adaptive signal preprocessor that reduces eigenvalue spread, as stated in column 5 lines 40-44.

It would have been obvious to one of ordinary skill in the art to use a signal preprocessor that reduces eigenvalue spread as taught by White, in the receiver of Chennakeshu to allow the receiver to settle quickly.

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14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al. in view of White et al. U.S. Patent 4,843,583.

Strolle discloses that the system uses blind equalization (i.e. without training data) in column 3 line 6, but fails to disclose that the feedback network of the second filter is non-linear.

White et al. disclose a non-linear function for adjusting filter taps in Fig. 1.

It would have been obvious to one of ordinary skill in the art to use a non-linear function as disclosed by White et al. to adjust the taps of the pre-equalizer disclosed by Strolle to combat the problem of nonlinear distortion as stated by White et al. in column 1 lines 30-43.

15. Claims 6 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strolle et al.

Regarding claim 6, Strolle discloses that the first filter (feed-forward equalizer 14) is an FIR filter, considered to comprise L taps, but does not expressly disclose that the taps are adjusted so that the output power is minimized.

However, it would have been obvious to one of ordinary skill in the art to minimize the output power to reduce energy consumption thereby reducing costs.

Regarding claim 22, Strolle fails to disclose that the receiver is used in a coaxial cable television infrastructure.

However, it would have been obvious to one of ordinary skill in the art to employ the receiver of Strolle in a coaxial cable television infrastructure because coaxial cable is a well-tested and proven communication medium.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **David B. Lugo** whose telephone number is **(703) 305-0954**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Stephen Chin**, can be reached at **(703) 305-4714**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:


(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

David B. Lugo
Patent Examiner

5/20/02


STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600